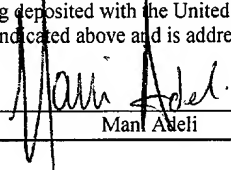


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 Mani Adeli	

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application for:

Steven Teig

Serial No.:

Filing Date: 1/13/02

For: METHOD AND APPARATUS FOR  
PRE-COMPUTING ATTRIBUTES OF  
ROUTES

Examiner: <not assigned yet>

Group Art Unit: <not assigned yet>

**PRELIMINARY AMENDMENT**

Assistant Commissioner of  
Patents and Trademarks  
Washington, D.C. 20231

Sir:

This Preliminary Amendment is concurrently filed with the above-entitled application, which is a continuation application of a presently pending application entitled "Routing Method and Apparatus that Utilize Diagonal Routes," filed on December 7, 2001, and having serial number 10/013,819. **Applicants respectfully request that claims 1-26 be canceled (pursuant to the amendment below) before calculation of the filing fee.**

Please amend the application as follows:

**IN THE TITLE**

Please replace the current title, "ROUTING METHOD AND APPARATUS THAT UTILIZE DIAGONAL ROUTES," with "METHOD AND APPARATUS FOR PRE-COMPUTING ATTRIBUTES OF ROUTES."

**IN THE SPECIFICATION**

Please delete the "Claim of Benefit to Prior Application" on page 1, lines 1-11, and insert therein a new Claim of Benefit to Prior Applications as follows:

**--CLAIM OF BENEFIT TO PRIOR APPLICATIONS**

This application is a continuation application of United States Patent Application entitled "Routing Method and Apparatus that Utilize Diagonal Routes," filed on December 7, 2001, and having serial number 10/013,819. This patent application also claims the benefit of the earlier-filed U.S. Provisional Patent Application entitled "Method and Apparatus that Utilize Diagonal Routes", having serial number 60/325,748, and filed 1/19/2001; U.S. Provisional Patent Application entitled "Routing Method and Apparatus", having serial number 60/314,580, and filed 8/23/2000; and U.S. Provisional Patent Application entitled "Routing Method and Apparatus", having serial number 60/337,504, and filed 12/6/2001--

Please delete the "Field of the Invention" on page 1, lines 10-12, and insert therein a new Field of the Invention as follows:

**--FIELD OF THE INVENTION**

The invention provides method and apparatus for pre-computing attributes of routes.--

On page 5, lines 1-8, please delete the "Summary of the Invention", and insert therein a new Summary of the Invention as follows:

**--SUMMARY OF THE INVENTION**

Some embodiments provide a method of pre-computing attributes of routes for nets in a region of a design layout. The pre-computed attributes are used by an electronic design automation application that partitions a design-layout region into a plurality of sub-region.

In some embodiments, a number of edges exist between the sub-regions. In these embodiments, the method identifies a first set of potential routes for a first set of sub-regions. Each route in the first set traverses the first set of sub-regions. For each particular edge between the sub-regions, the method identifies an edge-intersect cost that is dependent on the number of routes in the first set of routes that intersect the particular edge. Different embodiments define different edge-intersect costs. For instance, the edge-intersect cost of a particular edge (1) can be the number of first-set routes that

intersect the particular edge, (2) can be an edge-intersect probability that equals the number of first-set routes that intersect the particular edge divided by the total number of first-set routes, or (3) can be a cost derived from the edge-intersect probability. Other embodiments might define other edge-intersect costs. The method stores each identified edge-intersect cost for the first set of sub-regions.

In other embodiments, a number of paths exist between the sub-regions. In these embodiments, the method identifies a first set of potential routes for a first set of sub-regions. Each route in the first set traverses the first set of sub-regions. For each particular path between the sub-regions, the method identifies a path-use cost that is dependent on the number of routes in the first set of routes that use the particular path. Different embodiments define different path-use costs. For instance, the path-use cost of a particular path (1) can be the number of first-set routes that use the particular path, (2) can be a path-use probability that equals the number of first-set routes that use the particular path divided by the total number of first-set routes, or (3) can be a cost derived from the path-use probability. Other embodiments might define other path-use costs. The method stores each identified path-use cost for the first set of sub-regions.--

### **IN THE CLAIMS**

Please cancel claims 1-26.

Please add the following claims 27-38.

27. For an electronic design automation application that partitions a region of a design layout into a plurality of sub-region, wherein a plurality of edges exist between said sub-regions, a method of pre-computing attributes of routes for nets in the region, the method comprising:

- a) for a first set of sub-regions, identifying a first set of potential routes, wherein each route in the first set traverses the first set of sub-regions;
- b) for each particular edge, identifying an edge-intersect cost that is dependent on the number of routes in the first set of potential routes that intersect the particular edge;
- c) storing the identified edge-intersect costs for the first set of sub-regions.

28. The method of claim 27, wherein the edge-intersect cost of a particular edge equals the number of potential routes that intersect the particular edge.

29. The method of claim 27, wherein identifying the edge-intersect cost for each particular edge comprises:

identifying an edge-intersect probability for each particular edge, wherein the edge-intersect probability for each particular edge equals the number of potential routes of the first set that intersect the particular edge divided by the number of routes in the first set of routes.

30. The method of claim 29, wherein the cost for each particular edge equals the edge-intersect probability for the particular edge.

31. The method of claim 29, wherein identifying the cost for each particular edge further comprises deriving the cost for each particular edge from the edge-intersect probability of the particular edge.

32. The method of claim 27 further comprising:

a) for a second set of sub-regions, identifying a second set of potential routes, wherein each route in the second set traverses the second set of sub-regions;

b) for each particular edge, identifying an edge-intersect cost that is dependent on the number of routes in the second set of potential routes that intersect the particular edge;

c) storing the identified edge-intersect costs for the second set of sub-regions.

33. For an electronic design automation application that partitions a region of a design layout into a plurality of sub-region, wherein a plurality of paths exist between said sub-regions, a method of pre-computing attributes of routes for nets in the region, the method comprising:

a) for a first set of sub-regions, identifying a first set of potential routes that traverse the first set of sub-regions;

b) for each particular path, identifying a path-use cost that is dependent on the number of routes in the first set of potential routes that use the particular path;

c) storing the identified path-use costs for the first set of sub-regions.

34. The method of claim 33, wherein the path-use cost of a particular path equals the number of potential routes that use the particular path.

35. The method of claim 33, wherein identifying the path-use cost for each particular path comprises:

identifying a path-use probability for each particular path, wherein the path-use probability for each particular path equals the number of potential routes of the first set that use the particular path divided by the number of routes in the first set of routes.

36. The method of claim 35, wherein the cost for each particular path equals the path-use probability for the particular path.

37. The method of claim 35, wherein identifying the cost for each particular path further comprises deriving the cost for each particular path from the path-use probability of the particular path.

38. The method of claim 33 further comprising:

a) for a second set of sub-regions, identifying a second set of potential routes that traverse the second set of sub-regions;

b) for each particular path, identifying a path-use cost that is dependent on the number of routes in the second set of potential routes that use the particular path;

c) storing the identified path-use costs for the second set of sub-regions.

#### **IN THE ABSTRACT**

On page 175, lines 1-8, please delete the “Abstract of the Invention”, and insert therein a new Abstract of the Invention as follows:

#### **--ABSTRACT OF THE INVENTION**

Some embodiments provide a method of pre-computing attributes of routes for nets in a region of a design layout. The pre-computed attributes are used by an electronic design automation application that partitions a design-layout region into a plurality of sub-region.--

#### **REMARKS**

This Preliminary Amendment is concurrently filed with the above-entitled application, which is a continuation application of a presently pending application entitled

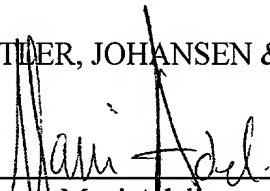


"Routing Method and Apparatus that Utilizes Diagonal Routes," filed on December 7, 2001, and having serial number 10/013,819. In this Preliminary Amendment, Applicants have changed the title of this application, inserted a reference to the related parent application, canceled claims 1-26, added claims 27-33, and replaced the Summary and Abstract. Accordingly, claims 27-33 are currently pending in this application.

Respectfully submitted,

STATTLER, JOHANSEN & ADELI LLP

Dated: 1/13/02

  
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